

An Efficient, Reliable, Vibration-Free Refrigerant Pump for Space Applications, Phase I

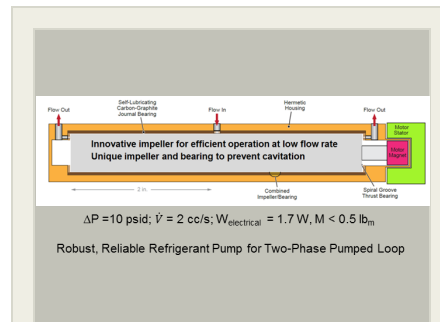
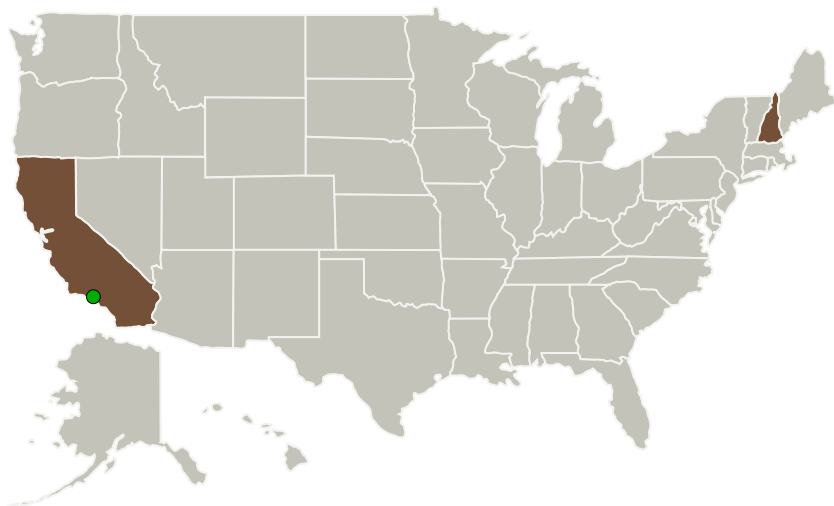
Completed Technology Project (2016 - 2016)



Project Introduction

NASA's future remote sensing science missions require advanced thermal management technologies to provide effective cooling for multiple instruments and reject heat through multiple radiators. Two-phase pumped loops are an ideal solution for these applications. A critical need for these pumped loops is a refrigerant pump that reliably circulates very slightly subcooled liquid refrigerant in the loop. To this end, Creare proposes to develop an efficient, vibration-free pump that has design features to prevent cavitation in the pumping chamber and in the hydrodynamic fluid bearings, and thus enables the pump to achieve a long service life. The development of the refrigerant pump will be built on Creare's proven high-speed turbomachine technologies for space applications. In Phase I, we will prove the feasibility of the refrigerant pump by developing a preliminary pump design, predicting its overall performance, and demonstrating its key features by testing. In Phase II, we will optimize the pump design, fabricate the pump, demonstrate its steady state and transient performance in a representative pumped loop, and deliver it to NASA JPL for further performance evaluation.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Creare LLC	Lead Organization	Industry	Hanover, New Hampshire
● Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations

California	New Hampshire
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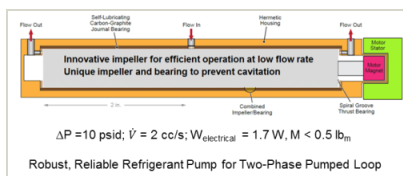
Project Transitions

**June 2016:** Project Start**December 2016:** Closed out

Closeout Documentation:

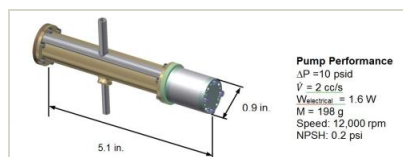
- Final Summary Chart(<https://techport.nasa.gov/file/139731>)

Images



Briefing Chart Image

An Efficient, Reliable, Vibration-Free Refrigerant Pump for Space Applications, Phase I
(<https://techport.nasa.gov/image/128271>)



Final Summary Chart Image

An Efficient, Reliable, Vibration-Free Refrigerant Pump for Space Applications, Phase I Project Image
(<https://techport.nasa.gov/image/127422>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Creare LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

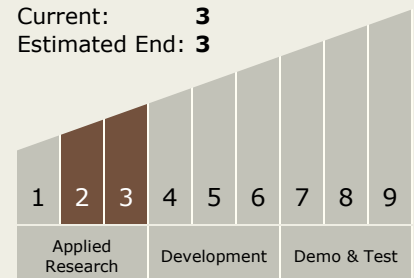
Carlos Torrez

Principal Investigator:

Weibo Chen

Technology Maturity (TRL)

Start: **2**
Current: **3**
Estimated End: **3**



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Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.2 Heat Transport

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System